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THE BEES OF THE SOUTHERN CALIFORNIA ISLANDS*

BY

T. D. A. COCKERELL

Professor Emeritus of Zoology
University of Colorado

There are eight islands off the coast of Southern California, if we consider Anacapa to be one, and ignore the small islets such as Princess Island off San Miguel. Until collections were made in 1937 and 1938, hardly anything was known of the bee-fauna of these islands, although they are fairly rich in species, some of which are evidently endemic. In the following lists the species as yet known only from the islands are marked with an asterisk and the species known from more than one island are indicated by the abbreviations M. (San Miguel), Cz. (Santa Cruz), Ca. (Santa Catalina), Cl. (San Clemente) and N. (San Nicolas).

(A.) NORTHERN GROUP

San Miguel Island

Bombus californicus Sm (Ca.)
**Bombus nevadensis miguelensis* Ckll.
**Bombus crotchii semisuffusus* Ckll.
**Anthidium palliventre vanduzeei* Ckll.
Osmia sp.
Anthophora edwardsii Cress. (Ca.)
**Anthophora californica erysimi* Ckll.
Tetralonia cordleyi Vier (Ca.)
Tetralonia robertsoni Ckll.
Emphoropsis miserabilis Cress.
Nomada edwardsii Cress.
**Epeolus eastwoodæ* Ckll.
**Perdita layiæ* Ckll.
Colletes californicus Prov.
Andrena complexa Vier.
Andrena perimelas Ckll. (Ca.)

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**Agapostemon californicus psammobius* Ckll.
Halictus pavonotus Ckll.
**Halictus hammondi* Ckll.
Halictus grinnelli Ckll.
Halictus nevadensis Crawf.
**Halictus megastictus* Ckll.
**Halictus perichlorus* Ckll.
**Halictus punctiferellus* Ckll.
**Halictus pilosicaudus* Ckll. (N.)
**Halictus cabrilli* Ckll.
**Halictus miguelensis* Ckll.

On May 8, after collecting on San Miguel for a week, about an hour before sailing I found some plants of *Ranunculus* which had been overlooked. Visiting them were females of *Andrena complexa* Viereck, a regular buttercup species, an addition to the island fauna. One wonders how they got there, and how they found the *Ranunculus;* or do both date back to a time when the northern chain of islands was united with the mainland?

Santa Rosa Island

A series of bees, not yet studied, was collected recently by the expedition from the Los Angeles Museum.

Santa Cruz Island

Augochlora pomoniella Ckll. (Ca.)
**Diadasia mimetica* Ckll (Ca., Cl., N.)

On August 20, 1938, I had a few hours at Fry's Harbor. It was excessively dry, and the only bees I could catch were a pair of *Diadasia mimetica,* at flowers of *Opuntia littoralis.*

Anacapa Island

Anthidium maculosum Cress.

(B.) Southern Group

Santa Catalina Island

Bombus californicus Sm. (M.)
Bombus vosnesenskii Rad.
Bombus edwardsii Cress.
Bombus sonorus Say.
Alcidamea hypocrita Ckll.
Osmia clarescens Ckll.
Osmia regulina Ckll.
**Anthidium catalinense* Ckll.
Megachile (only known by cut leaves)
**Dioxys catalinensis* Ckll.
Cœlioxys sp. (male, Meadows Coll.)
Nomada semisuavis Ckll.
**Nomada avalonica* Ckll.
Nomada formula Vier.
Tetralonia cordleyi Vier. (M.)
Emphoropsis depressa Fowler
Anthophora stanfordiana Ckll.
**Anthophora catalinæ* Ckll.
Anthophora edwardsii Cress. (M.)
Dasiapis ochracea Ckll.
Exomalopsis nitens Ckll.
**Diadasia mimetica* Ckll. (Cl., N., Cz.)
Diadasia opuntiæ Ckll. (Cl.)
Melissodes lupina Cress. (*catalinensis* Ckll.)
**Epeolus piscatoris* Ckll.
Ceratina nanula rigdenæ Mich.
Colletes eriogoni Ckll.
**Hylaeus polifolii catalinensis* Ckll.
**Diandrena gnaphalii* Ckll.
**Andrena escondida* Ckll.
**Andrena meadowsi* Ckll.
Andrena perimelas Ckll. (M.)
Andrena auricoma Sm.

Andrena n. sp. Timb.
**Andrena hypoleuca* Ckll.
**Andrena catalinica* Ckll.
Andrena mimetica falli Ckll.
Andrena sp. (Meadows Coll.)
Agapostemon californicus Crawf. (N.)
Augochlora pomoniella Ckll. (Cz.) (*pura*, err. det., Seavey, 1892)
**Halictus cooleyi obscurior* Ckll.
Halictus nevadensis Crawf. (M., Cl., N.)
Halictus n. sp. Timb.
Halictus helianthi Ckll.
Halictus meliloti catalinensis Ckll.
Halictus ovaliceps Ckll.
Halictus incompletus Crawf. (N.)
Halictus sp.
**Halictus avalonensis* Ckll. (Cl.)
Apis mellifera L. (introduced)

The species recorded as *Osmia regulina* is perhaps a race of *O. cobaltina* Cresson.

San Clemente Island

**Anthophora catalinæ clementina* Ckll.
Diadasia opuntiæ Ckll. (Ca.)
**Diadasia mimetica* Ckll. (Ca., N., Cz.)
**Melissodes scotti* Ckll.
**Agapostemon californicus clementinus* Ckll.
**Halictus avalonensis* Ckll. (Ca.)
Halictus nevadensis Crawf. (Ca., M., N.)

Santa Barbara Island

A few bees were collected by the expedition from the San Diego museum, and the account has been published by that museum. One subspecies of *Anthidium* is new.

San Nicolas Island

**Anthophora nicolai* Ckll.
**Diadasia mimetica* Ckll. (Ca., Cl., Cz.)
Agapostemon californicus Crawf. (Ca.)
**Halictus pilosicaudus* Ckll. (M.)
Halictus nevadensis Crawf. (M., Ca., Cl.)
Halictus incompletus Crawf. (Ca.)

Some undetermined species in the above lists are represented by single specimens, and it is hoped that more material may be obtained.

The following records are new:

Anthophora nicolai Cockerell, new species

Female (*Type*). With rufous hair as in *A. catalinæ* Ckll, but resembles *A. urbana* Cresson in lacking the black hair on sides of thorax and outer side of legs. The face is broader than in *A. urbana*.

Male. Similar to the San Clemente form of *A. catalinæ*, but hair on inner side of hind tarsi light ferruginous instead of black, and the white spot on mandibles much larger. The white face is like that of *A. urbana*, except that the black marks at sides of clypeus are a little larger, and the upper extension of lateral marks along orbit is more slender. The hair of the face is whitish, becoming dense and red in the region of the antennæ; that of the thorax above is red.

California: **San Nicolas Island,** July 7, 6, 9, 1938 (*Cockerell*). It visits *Abronia maritima* and *Mesembryanthemum crystallinum.*

Anthophora catalinæ clementina Cockerell, new subspecies

Female (*Type*). Like *A. catalinæ* Ckll, but hind tibiæ and tarsi with hair all black, or it may be slightly pallid along posterior margin of tibia. The clypeus has black hair, and the sides of the thorax are black haired except the upper part.

Male. Similar to *A. urbana* Cresson, but with the hair usually much redder, that on the thorax above exceedingly rich deep red in some specimens. Thorax with reddish hair at sides, but black beneath (this is not so in *A. urbana);* face with whitish hair, red in region of antennæ and front; tibiæ and basitarsi with pale hair on outer side, on inner (posterior) side of middle and hind tibiæ and tarsi it is black, which is not at all true of *A. nicolai* or *A. urbana.* The white face is like that of *A. urbana,* but the black marks at sides of clypeus are much larger and longer, and the lateral marks are more deeply emarginate above.

California: **San Clemente Island,** June 17 to 21, 1938 (Cockerell, J. T. Scott). Common at Wilson's Cove; visits *Hemizonia clementina, Convolvulus macrostegius* (males), and *Mesembryanthemum crystallinum* (both sexes). The very red form of the male, contrasted with the palest, looks like an entirely different species; the pale form is superficially like *A. urbana.*

A. catalinæ was described from a single female taken by my wife on Catalina Island, August, 1901. In 1938, I left Catalina Island June 14, and returned Aug. 29. In the interval, *A. catalinæ* must have come and gone, for persistent search when we were on the island failed to produce a single specimen.

Melissodes scotti Cockerell, new species

Female (*Type*). Length about 12 mm., resembling *M. hymenoxidis* Ckll, with the same black hair on pleura, and on front and middle legs, though the middle tarsi have light reddish hair, ferruginous on inner side. Much black hair on clypeus and front but a tuft of long pale hair at each side of upper part of face, a character more or less apparent in *M. hymemoxidis;* cheeks and occiput with white hair, but long, black hair on vertex; flagellum bright ferruginous beneath, except at base; thorax anteriorly with a broad, sharply defined collar of pale fulvescent pubescence, but the rest of the mesonotum, as well as the scutellum, is clothed with long black hair (much less black hair in *M. hymenoxidis);* region behind wings with pale hair; tegulæ black, with a tuft of black hair; wings dusky; stigma and nervures black (much paler in *M. hymenoxidis);* scopa of hind tibiæ and tarsi pale reddish, very copious; abdomen with black hair, but second tergite with a thin band of pale at extreme base, and a dense, entire, pale fulvescent band apically; third and fourth tergites with fulvescent bands like that on second; apex with dark hair, a little pale reddish at each side of apical plate, which is more slender and produced than in *M. hymenoxidis.* The thorax is appreciably more robust than in *M. hymenoxidis.*

California: **Wilson's Cove, San Clemente Island,** June 17, 1938 (J. T. Scott.)

Melissodes lupina Cresson

California: Santa Catalina Island, Pebbly Beach, June 4, female at *Malacothrix saxatilis* Nuttall, (Cockerell); Fisherman's Cove, June 9, both sexes (*W. P. Cockerell, Cockerell*). At the latter place it occurred resting in flowers of *Calochortus*, and one was taken on *Sinapis*. I had only the male of *M. lupina*, and the female of *M. catalinensis* (Ckll), but they are one species, as Timberlake pointed out to me.

Dasiapis ochracea Cockerell

California: Santa Catalina Island, Fisherman's Cove, June 9, (*W. P. Cockerell, Cockerell*). Many males resting in flowers of *Calochortus;* one at flowers of *Opuntia littoralis*.

Exomalopsis nitens Cockerell

California: described from Laguna, and I have a pair from Westwood Hills, June and August (E. G. Linsley). On Catalina Island, my wife took two at Rancho Escondido, June 6, both males, at flowers of *Opuntia littoralis*, and I took a female at the same locality, resting in a flower of *Bloomeria crocea*. On June 9, we found the species common at Fisherman's Cove, both sexes resting in the flowers of *Calochortus*. On June 11, a female was taken in Cape Canyon at flowers of *Malvastrum catalinense*.

Augochlora pomoniella Cockerell

California: abundant on Santa Catalina Island, first appearing March 31. In Cape Canyon, Aug. 30, both sexes were numerous on flowers of *Eremocarpus setigerus*. On Sept. 1, near the highest point on the road, a female was taken at flowers of *Eriogonum giganteum*. At Rancho Escondido, March 31, it was taken on *Encelia californica*.

Agapostemon californicus clementinus Cockerell, new subspecies

Male (*Type*). Like the specimen of *A. c. psammobius* Ckll. from Princess Island, with strongly blue mesothorax, and yellow band on first tergite broadly interrupted, or sometimes very narrowly continuous. The genitalia are entirely of the *A. texana* type (as figured by Miss Sandhouse).

Female. Like *A. c. psammobius*, but very blue; tegulæ very dark; sculpture of metathorax delicate.

California: Common on **San Clemente Island** (*Cockerell, J. T. Scott*), middle of June, both sexes at flowers of *Convolvulus macrostegius* and *Hemizonia clementina*. Female at *Mesembryanthemum crystallinum*. Crawford, in his original account of male *A. californicus*, says "head and thorax blue above," and the race now described might be referred to the typical form without much difficulty, so far as described characters go. The genitalia appear to separate it from the very similar *A. c. psammobius*, from San Miguel Island. However, *A. californicus* is very common on the mainland, and is emerald green in the female like *A. texanus*, with which Miss Sandhouse proposes to unite it. The whole series from San Clemente is remarkable for the rich purple-blue colour in both sexes, and contrasts strongly with specimens from Santa Catalina and San Nicolas Islands, the females from these islands being green, and quite like the common form on the mainland, for example at La Jolla. On San Nicolas, in July, I got only females of *A. californicus* Crawford; they were at flowers of *Opuntia littoralis* and *Mesembryanthemum crystallinum*.

Nomada formula Viereck

California: Santa Catalina Island, Fisherman's Cove, at flowers of *Sinapis*, June 9 (*W. P. Cockerell*).

Nomada semisuavis Cockerell

California: Santa Catalina Island, Pebbly Beach; both sexes taken, June 4 and 13 (*W. P. Cockerell*). It visits flowers of *Malacothrix saxatilis*. Previously known from Washington State, far to the north. I have a male taken at Avalon, Catalina Island, by Don Meadows, Aug. 28, 1929.

Epeolus piscatoris Cockerell, new species

Female (*Type*). Length about 8 mm; black, including mandibles, antennæ, tegulæ and legs, except that the small joints of tarsi are obscurely rufescent; eyes green; pale pubescence tinged with brown; clypeus with fine dense punctures and scattered larger ones, a median line obscurely indicated; dense pale hair in region of antennæ and at sides of upper part of face; a band of pale hair on upper part of cheeks; mesothorax margined at sides and behind with pale hair, and two strong parallel bands on disc; mesothorax and scutellum densely punctured; mesopleura except lower part, covered with coarse pale hair; wings dusky, with black nervures; second cubital cell very narrow above, very broad below, receiving recurrent nervure about middle; spurs black, middle and hind tibiæ with pale hair on outer side; hair on inner side of hind basitarsi pale reddish; first tergite with a broad transverse black band, its lateral corners acute; apical hair-band on same tergite broad, with a linear interruption; lateral corners of black area on second tergite very acute; each side of end of abdomen with a large patch of thin pale hair; venter black, the second and third sternites with white bands at sides.

California: **Santa Catalina Island,** Fisherman's Cove, at flowers of *Sinapis*, June 9, 1933 (W. P. Cockerell). In my table in University of Colorado Studies, XVI, p. 106, it runs out at 14, on account of the interrupted, broad band on second tergite. By the hairy pleura and black spurs it resembles *E. bihamatus* Ckll., which differs by the flagellum red beneath and other characters. In the table in Proc. Calif. Acad. Sci., 4th Ser. Vol. XIII, 1924, p. 321, it runs out at 7, distinguished by the black legs. In the table in Am. Mus. Novitates, no. 23, it runs out at 8. Timberlake has never seen it in Southern California.

Anthidium catalinense Cockerell, new species

Male (*Type*). Length about 14 mm., anterior wing 10; black, with sulphur yellow markings, which include mandibles except the tridentate apex, entire clypeus (which has a dull surface), lateral marks (filling space between clypeus and eye, and extending upward to level of antennæ), a cuneate mark above each eye, large spot on tegulæ in front (but no marks on thorax), middle tibiæ with a quadrate spot at apex, and small line at base; hind tibiæ with an interrupted stripe on basal half, stripe on outer side of basitarsi, four large spots on tergites 1 to 3, on 4 and 5 they are narrowly united on each side, the sixth has a band with linear interruption, but the seventh is all black. Pubescence mostly clear white, but reddish brown on head and thorax above; front and vertex dull, and very densely punctured; mesonotum dull, scutellum shining in middle posteriorly; base of metathorax shining in middle; wings strongly dusky; lateral apical lobes very broadly dentiform, triangular, the apical point directed mesad; median spine not extending to level of ends of lobes; subapical median process strongly bidentate.

Female. Length about 12 mm.; hair of head and thorax above paler; clypeus with two very large yellow marks, separated by a narrow interval, the upper end of each mark rectangular; no lateral marks; cuneiform marks above eyes long, longer than the interval between them; a small yellow spot above tegulæ, a yellow spot on tubercles, and a couple of transverse marks on scutellum; legs black, the front and middle basitarsi brilliantly white from a covering of hair; hind tarsi with red hair on inner side and white on outer, bright yellow band on first tergite interrupted in middle and emarginate posteriorly on each side; second tergite with four spots; on tergites 3 to 5 the spots are united laterally; the sixth tergite has two large quadrate yellow marks; ventral scopa clear white.

California: **Santa Catalina Island,** the male from **Fisherman's Cove,** in a flower of *Calochortus*, June 9 (*W. P. Cockerell*); female from Pebbly Beach, June 13 (*Cockerell*). The sexes appear to be correctly associated, but proof is lacking. The species could not be matched at the Citrus Experiment Station of the University of California. In the table by Schwarz in Am. Mus. Novitates, 253, the male runs to *A. tenuiflorœ* Ckll., which is smaller, with much paler markings. The female runs to *A. palmarum* Ckll., differing in the colour of the legs and other characters; the markings on tergites 3 to 6 resemble those of *A. porterœ* Ckll.

Halictus pilosicaudus Cockerell

California: San Nicolas Island, at flowers of *Malacothrix implicata* and *Mesembryanthemum crystallinum*, July 8 to 15 (*Cockerell*). Previously known only from San Miguel Island.

Halictus meliloti catalinensis Cockerell

Common on Santa Catalina Island, new localities are Fisherman's Cove, at flowers of *Calochortus* and *Sinapis;* and Cape Canyon, at flowers of *Opuntia littoralis*.

Halictus incompletus Crawford

California: Mr. Timberlake, being very familiar with this small species in southern California, was able to sort out no less than 21 specimens from my recent island collections; the data are as follows: San Nicolas Island, July, at *Mesembryanthemum crystallinum*, *Hemizonia clementina*, and *Heliotropium oculatum*.

Santa Catalina Island: Fisherman's Cove, many at flowers of *Sinapis* (*W. P. Cockerell*), and we found them resting in flowers of *Calochortus*. Isthmus, Aug. 31 (*Cockerell*). Rancho Escondido, June 6 (*W. P. Ckll., Ckll.*), female at *Opuntia littoralis*, both sexes flying round *Salvia mellifera*.

Halictus nevadensis Crawford

The following were referred here by Timberlake:

San Nicolas Island, July 9 (*Ckll.*). At *Mesembryanthemum crystallinum*.

San Clemente Island, Wilson's Cove, June 21 (J. T. Scott).

Santa Catalina Island, Pebbly Beach, June 4 (W. P. Ckll.).

Halictus helianthi Cockerell

Santa Catalina Island, Avalon, at flowers of *Chrysanthemum frutescens*, the Marguerite daisy, Sept. 1, (*Cockerell*). Cape Canyon, June 11 (*Ckll.*), at *Opuntia littoralis*. There are two other species of the subgenus *Chloralictus* in the collection. One, near *H. nevadensis*, is represented by a single specimen from Rancho Escondido; the other, with four from Fisherman's Cove and one from Rancho Escondido, is a species well-known to Timberlake from the mainland, and named by him in manuscript after Fowler.

Halictus cooleyi obscurior Cockerell, new subspecies

Female (*Type*). Compared with a paratype *H. cooleyi* Crawford, from Corvallis, Oregon, it differs by the much duller, less polished mesonotum, the dark tegulæ and the smaller head.

Male. Smaller than my males of *C. cooleyi*, and distinguished by the total lack of hairy fringes on the subapical sternites of abdomen.

California: **Santa Catalina Island, Cape Canyon** (type locality), June 11, at *Opuntia littoralis*, females, (*Ckll.*); Fisherman's Cove, at *Sinapis*, June 9, both sexes (*W. P. Ckll.*); Avalon, June 8, at *Chrysanthemum frutescens*, (*Ckll.*).

Halictus avalonensis Cockerell

Santa Catalina Island; a female in flower of *Calochortus*, Fisherman's Cove, June 9 (*W. P. Ckll.*). The male, hitherto unknown, is represented by a series as follows:

Santa Catalina Island, at *Sinapis* and *Calochortus*, Fisherman's Cove, June 9 (*W. P. Ckll.*); Avalon, June 8, at *Chrysanthemum frutescens*, (Ckll.).

San Clemente Island; three at flowers of *Convolvulus macrostegius*, June 18 (*Ckll.*); Wilson's Cove, two at *Hemizonia clementina*, June 21 (*J. T. Scott*).

The male has lower part of clypeus, spot on mandibles, and labrum cream color; face with white hair; antennæ very long, flagellum variably reddened beneath; stigma sometimes very dark; anterior tibiæ pale reddish in front; tarsi yellowish-white, more or less rufescent apically. In Crawford's table (1907) it runs to 19, and here should doubtless go in the group with dark tubercles, but the tubercles have a very minute light spot in the Scott specimen from San Clemente, in the Calochortus one from Fisherman's Cove, and in the specimens from Avalon. The dull mesonotum would place it with *H. niger* Viereck, which is a much larger species, or with *H. cordleyi* Crawford, which is also larger and more robust. I know only the female of *H. cordleyi;* it differs from that sex of *H. avalonensis* by its much more robust form and duller clypeus.

Ceratina nanula rigdenæ Michener

Santa Catalina Island; Cape Canyon, Aug. 30, three females (W. P. Ckll.). It visits flowers of *Eremocarpus setigerus*. It was probably this which Seavey (1892) recorded as *C. acantha* Provancher.

Andrena mimetica falli Cockerell

Santa Catalina Island; Avalon, females abundant at *Cotoneaster*, June 3 to 5 (*W. P. Ckll., Ckll.*). A new species of *Andrena* (named in manuscript by Timberlake, who found it on the mainland) was taken at Middle Ranch.

Bombus sonorus Say

Santa Catlina Island; White's Landing, April 13, and Avalon, Sept. 11 (*D. Meadows*); Cape Canyon, June 11, visiting *Solanum douglasii* (*W. P. Ckll., Ckll.*). Later in the year it was very abundant.

B. edwardsii Cresson, *B. vosnesenskii* Rad., and *B. californicus* Smith were also taken at Avalon. The males of *B. edwardsii* were at cultivated *Statice*, March 21 and April 1. *B. vosnesenskii* was taken at Rancho Escondido, June 6 (W. P. Ckll.).

Osmia clarescens Cockerell

Santa Catalina Island; Rancho Escondido (Ckll.), June 6. Females visiting *Astragalus leucopsis*.

I am greatly indebted to Mr. P. H. Timberlake of the Citrus Experiment Station of the University of California with whom I examined most of the bees from the islands, and his critical judgment has gone far to fortify the determinations. At the same time, he must not be held responsible for my decisions.